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Checklist

The first record of Ripiphoridae (Coleoptera, Cucujiformia, Tenebrionoidea) family in Georgia

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Abstract

The Ripiphoridae family is reported from Georgia for the first time, based on the collected specimens of *Macrosiagon bimaculata* (Fabricius, 1787), *Ptilophorus dufouri* (Latreille, 1817), and *Ripiphorus subdipterus* (Bosc d'Antic, 1792). Collection data, along with photographs of the preserved specimens, are provided.

Key words: Caucasus, new records, Polyphaga, wedge-shaped beetles

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Introduction

The wedge-shaped beetles (Ripiphoridae) have long attracted the attention of entomologists due to the uniqueness of their ecology, which sets them apart from all the Coleoptera, as they are the only among them known for endoparasites that develop, at least partially, in the bodies of other animals. Members of the family differ in their host preferences. The larvae of Ripiphorinae species typically target various species of aculeate Hymenoptera, while some species of Ripidiinae attack cockroach nymphs, and Pelecotominae species target beetles' larvae. The developmental cycle is inadequately studied, known for only a few species, and is characterized by hypermetamorphic larvae, a characteristic shared with blister beetles (Meloidae) (Heitmans et al. 1994).

This small family includes 38 genera comprised in six subfamilies with about 400 species distributed worldwide (Lawrence et al. 2010), of which 14 species (*Blattivorus margaritae* Rikhter, 1949; *Clinops spectabilis* Schaufuss, 1872; *Macrosiagon bimaculata* (Fabricius, 1787); *M. ferruginea* (Fabricius, 1781); *M. medvedevi* (Iablokoff-Khnzorian 1973); *M. praeusta* (Gebler, 1829); *Metoecus paradoxus* (Linnaeus, 1761); *Pterydrias debilis* Reitter, 1895; *Ptilophorus dufouri* Latreille, 1817; *P. plumicornis* (Reitter, 1898); *Ripiphorus subdipterus* Bosc d'Antic, 1792; *R. syriacus* (Pic, 1904); *R. turcicus* (Pic, 1914); *Ripidius quadriceps* Abeille de Perrin, 1872) are recorded from the countries neighbouring Georgia (Iablokoff-Khnzorian 1975, 1976; Batelka 2008; Barkley 2020). Herein, we present the first record of the family Ripiphoridae in Georgia, along with collection data and photographs of three species, namely *Macrosiagon bimaculata*, *Ptilophorus dufouri*, and *Ripiphorus subdipterus*.

Materials and methods

The material for the present study was collected in 2021-2023, during individual forays to Gori and the vicinity of Tbilisi, organized within the Caucasus Barcode of Life (CaBOL - https://ggbc.eu/). The specimens were collected by hand, during the day from the stems of the weathered plants, then preserved in 96% ethanol and deposited in the collection of ISU for further genetic studies. For identification, the keys by Iablokoff-Khnzorian (1975, 1976) and Batelka (2007) were used. Photos of the preserved specimens (Figs. 1-3) were taken using a Canon EOS 5D Mark II camera with a Canon MP-E 65mm f/2.8 1-5x Macro Photo Lens attached and a Canon Macro Twin Lite MT-26EX-RT, with the whole system mounted on a Novoflex Castel-L Focusing Rack. Digital images were prepared using Zerene Stacker image stacking software and Adobe Photoshop CS6 (version 13.0).

Results

Taxonomic part

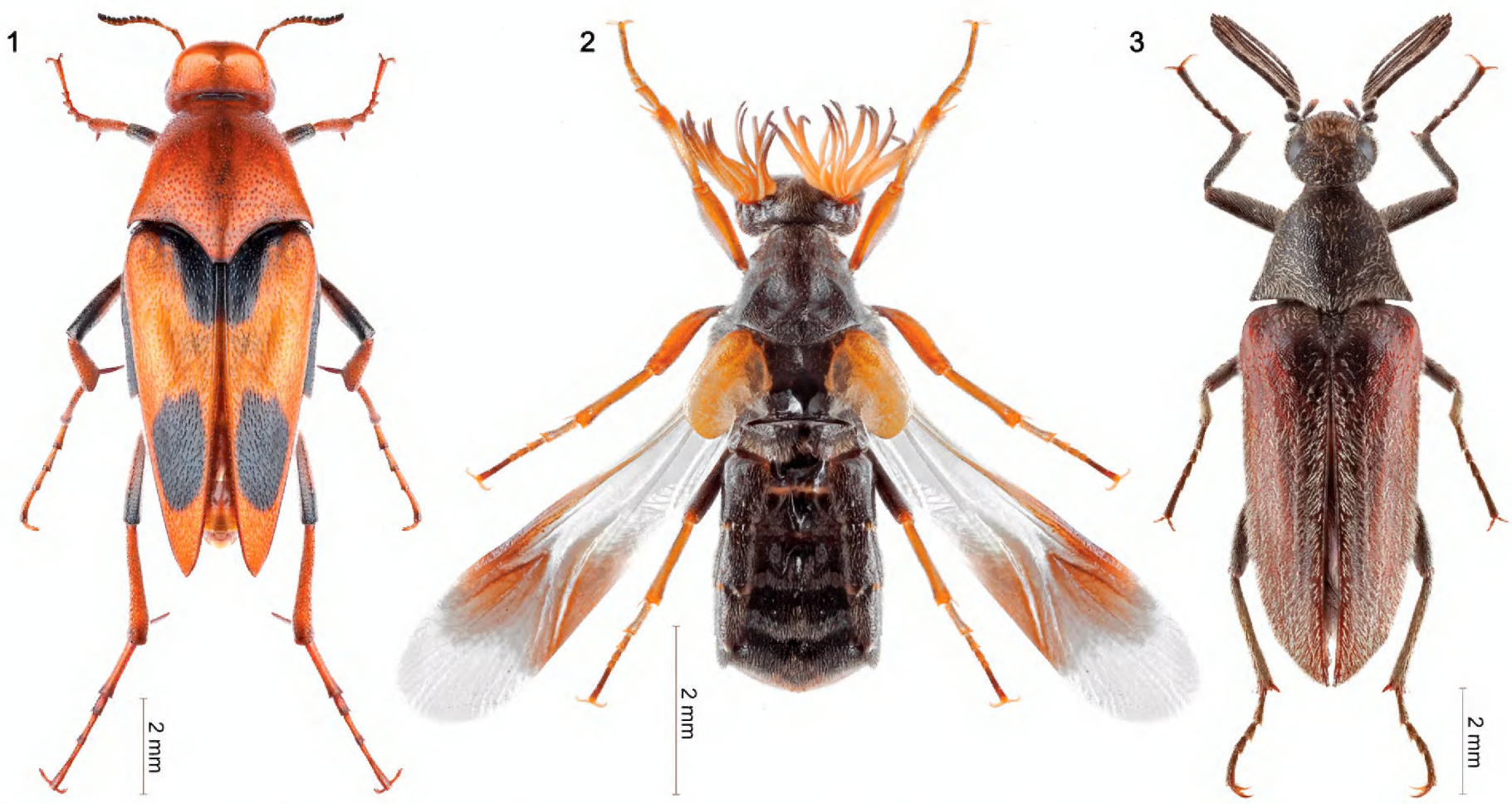
Family Ripiphoridae Gemminger & Harold, 1870

Subfamily Ripiphorinae, Gemminger 1870

Genus ***Macrosiagon*** Hentz, 1830

***Macrosiagon bimaculata* (Fabricius, 1787)**

Material examined. GEORGIA – Shida Karlti region • 3♀♀; Gori; 41.9811°N, 44.0921°E; 586 m a.s.l.; steppe, *Eryngium* sp.; leg. Bulbulashvili N.; 6 Aug 2022; CaBOL-IDs: 1027991, 1027992, 1027993 (Fig. 1).



Figures 1–3. 1: *Macrosiagon bimaculata*, female, dorsal view. **2**: *Ripiphorus subdipterus*, male, dorsal view. **3**: *Ptilophorus dufouri*, male, dorsal view.

Remarks. The sampling data of Georgian specimens corresponds to that of Iablokoff-Khnzorian (1976), according to whom this species could be found in July-August on flowering *Eryngium* sp. The species of the *Macrosiagon* genus are known to be parasitoids of a broad variety of wasps and bees. As in other genera of the subfamily Ripiphorinae, the eggs are laid on different parts of plants where the newly hatched first instar larvae (triungulin) actively attach to the body of the host wasp or bee and are transported into the host nest. A recent study suggested associations with different genera or subfamilies of bees or wasps in species or species complexes of *Macrosiagon* (Batelka and Hoehn 2007); however, the biology of most of them (including *M. bimaculata*) remains poorly known.

Distribution. A Western Palaearctic species known from North Africa, the Iberian Peninsula, France, Italy, Hungary, Bulgaria, Poland, Montenegro, Israel, Russia, the Caucasus (but not from Georgia), Kazakhstan, Iran (as "Persia"), and Turkestan. From the neighboring territories, *M. bimaculata* is recorded in Armenia, Turkey, and Ukraine (Crimea) (Iablokoff-Khnzorian 1976; Batelka et al. 2016).

Genus *Ripiphorus* Bosc, 1791

Ripiphorus subdipterus Bosc d'Antic, 1792

Material examined. GEORGIA – Tbilisi • 1♂; Dighomi Vill.; 41.7799°N, 44.7092°E; 657 m a.s.l.; *Paliurus spina-christi* dominated shrubland, dried *Achillea* sp.; leg. Bulbulashvili N., Seropian A.; 24 Jul. 2021; CaBOL-ID: 1011779 (Fig. 2).

Remarks. According to Chobaut (1906), the host of *R. subdipterus* first-instar larva is *Halictus* (*Halictus*) *sexcinctus* (Fabricius, 1775) – a solitary bee species known to occur in Georgia (Tarkhnishvili et al. 2013).

Distribution. A Western Palaearctic species, known from Kazakhstan, Uzbekistan, France, Italy, the Iberian Peninsula, Albania, Bulgaria, Croatia, Crete, Cyprus, Montenegro, North Africa, and Israel. From the neighboring territories, *R. subdipterus* is recorded in Armenia and Azerbaijan (Iablokoff-Khnzorian 1976; Batelka et al. 2016).

Subfamily Pelecotominae Seidlitz, 1875

Genus *Ptilophorus* Dejean, 1834

Ptilophorus dufouri Latreille, 1817

Material examined. GEORGIA – Tbilisi • 2♀♀; Dighomi Vill.; 41.7781°N, 44.7003°E; 476 m a.s.l.; *Paliurus spina-christi* dominated shrubland, twigs; leg. Bulbulashvili N., Seropian A.; 27 Apr 2023; CaBOL-IDs: 1035452 (Fig. 3), 1035453.

Remarks. Unlike most wedge-shaped beetles, the adults of *Ptilophorus* have mouthparts adapted to feeding on liquid food, although the feeding behavior has never been observed (Iablokoff-Khnzorian 1975). The host is unknown, as were the larvae for a long time, whose weakly sclerotized, very small bodies and simplified mouthparts strongly suggest a parasitic way of life and consumption of liquid food (Batelka et al. 2022).

Distribution. A Western Palaearctic species, known from North Africa, the Iberian Peninsula, France, Italy, Greece, Bulgaria, Hungary, Romania, Israel, Iran, and the Caucasus (but Georgia). From the neighboring territories, *P. dufouri* is recorded in Armenia, Turkey, and Ukraine (Crimea) (Iablokoff-Khnzorian 1975; Batelka 2008; Barkley 2020).

Discussion

According to Batelka (2008) and Bakrley (2020), there are approximately 60 species of Ripiphoridae documented in the Palaearctic region, of which 14 species, including the herein-reported first finds for Georgia, are recorded from the territories of adjacent countries (see Introduction). Although Iablokoff-Khnzorian laid a foundation with his research of Ripiphoridae of the USSR, the absence of prior finds of the wedge-shaped beetles in Georgia doesn't necessarily imply insufficient studies in the country and most likely is associated with the biological aspects of these insects, with most species known to have a very short lifespan, making them available for collection and observation only during a relatively short period (Iablokoff-Khnzorian 1975, 1976; Batelka 2007). Summarizing the above, the number of Riphiporidae species within the fauna of Georgia remains undefined, as it is yet to be thoroughly studied and is highly expected to yield additional discoveries of new species.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

TI and SJ led the writing, AS and NB performed specimen collecting, AS prepared photos.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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